REMARKS

As stated above, Applicants appreciate the Examiner's thorough examination of the subject application and request reexamination and reconsideration of the subject application in view of the preceding amendments and the following remarks. Applicants have carefully reviewed and considered the Office Action mailed on December 29, 2005, and the references cited therewith. Reconsideration and allowance of the subject application, as amended, is respectfully requested.

Presently, claims 1-23 are pending. Independent claims 1, 6, 16 and 19 have been amended, claims 11 and 12 have been cancelled; as a result, claims 1-10 and 13-23 are now pending in this application.

Regarding the section of the subject office action entitled "Specification", the Examiner appears to state that the title of the subject application is not descriptive. The Examiner suggests that a new title be provided that is clearly indicative of the invention to which the claims are directed.

As mentioned above, the Applicants have replaced the title "POWER CONVERTER" with the new title "A SYSTEM AND METHOD FOR POWER CONVERTER SWITCH CONTROL".

Regarding the section of the subject action entitled "Claim Objections", the Examiner objects to claim 16. In particular, the Examiner suggests that claim 16 presents no new inventive information over the preceding claims 1-15.

Applicants respectfully disagree with the Examiner's objection. Independent claim 16 includes subject matter (i.e., a full bridge circuit) that is not present other independent claims 1, 6 and 19. Thereby, the subject matter of independent claim 16 is distinct and patentable.

Regarding the section of the subject action entitled "Claim Rejections - 35 USC §102", the Examiner rejects claims 1-23, under 35 USC §102(e) as being anticipated by Wei et al. (U.S. Patent Application Publication No. 2004/0100805; hereinafter Wei).

The Examiner points to Wei as disclosing an electronic device (paragraph 0005, lines 1-5, microprocessor with a power converter) comprising: a power converter to accept an input power signal (Fig. 2 V_{in}) and to provide an output power signal (Fig. 2 V_{out}). The Examiner also points to Wei as disclosing that the power converter comprises: a transformer having a primary

winding and a secondary winding (Fig. 2 transformer M, primary W1, secondary W2); and a plurality of switches coupled to said primary and secondary winding (Fig. 2 switches Q1-Q6). The Examiner also points to Wei as disclosing that the plurality of switches responsive to at least one control signal to short both said primary and secondary winding during a first reset time interval (page 2, paragraph 0023, Fig. 4C shows switches Q2 and Q3 operable to short both primary and secondary of transformer M).

Applicants claim (in amended independent claim 1)

1. A power converter comprising:

a transformer having a primary winding and a secondary winding; and

a plurality of switches coupled to said primary and secondary winding, said plurality of switches responsive to at least one control signal to short both said primary and secondary winding during a first reset time interval, said plurality of switches includes a first pair of switches configured to be simultaneously controlled using a first control signal and a second pair of switches configured to be simultaneously controlled using a second control signal, wherein the first pair of switches is coupled in series to one end of said secondary winding and the second pair of switches is coupled in series to an opposite end of said secondary winding.

Applicants also claim (in amended independent claim 6)

6. An electronic device comprising:

a power converter to accept an input power signal and provide an output power signal, said power converter comprising:

a transformer having a primary winding and a secondary winding; and

a plurality of switches coupled to said primary and secondary winding, said plurality of switches responsive to at least one control signal to short both said primary and secondary winding during a first reset time interval, said plurality of switches includes a first pair of switches configured to be simultaneously controlled using a first control signal and a second pair of switches configured to be simultaneously controlled using a second control signal,

wherein the first pair of switches is coupled in series to one end of said secondary winding and the second pair of switches is coupled in series to an opposite end of said secondary winding.

Applicants also claim (in independent claim 13)

13. A method comprising:

providing a first control signal to control a state of a first high side switch coupled to a first path of a full bridge circuit;

providing a second control signal to control a state of a second high side switch coupled to a second path of said full bridge circuit, said full bridge circuit coupled across a primary winding of a transformer;

providing a third control signal to simultaneously control a state of a first low side switch coupled to said first path of said full bridge circuit and a state of a first rectifier switch of a rectifier circuit, said first rectifier switch coupled to one end of a secondary winding of said transformer; and

providing a fourth control signal to simultaneously control a state of a second low side switch coupled to said second path of said full bridge circuit and a state of a second rectifier switch of said rectifier circuit, said second rectifier switch coupled to an opposite end of said secondary winding of said transformer.

Applicants also claim (in amended independent claim 16)

16. A power converter comprising:

a full bridge circuit having a first path and a second path, each path comprising a high side and low side bridge switch connected in series, each path having a node between said high side and low side bridge switches, and each path coupled to an input voltage terminal;

a transformer having a primary winding and a secondary winding, said primary winding being coupled between said nodes of said paths of said full bridge circuit; and

a rectifier circuit coupled to said secondary winding, said rectifier circuit comprising a first and second rectifier switch, said first rectifier switch coupled in series to said low side switch of said first path to one end of said secondary winding, said second rectifier switch coupled in series to said low side switch of said second path to an opposite end of said secondary winding, said low side switch of said first path and said first rectifier switch simultaneously driven by a first control signal and said low side switch of said second path and said second rectifier switch simultaneously driven by a second control signal.

Applicants also claim (in amended independent claim 19)

19. A power converter comprising a plurality of DC to DC converters coupled in parallel, at least one of said plurality of DC to DC converters comprising:

a transformer having a primary winding and a secondary winding; and

a plurality of switches coupled to said primary and second winding, said plurality of switches responsive to at least one control signal to short both said primary and secondary winding during a first reset time interval, said plurality of switches includes a first pair of switches configured to be simultaneously controlled using a first control signal and a second pair of switches configured to be simultaneously controlled using a second control signal, wherein the first pair of switches is coupled in series to one end of said secondary winding and the second pair of switches is coupled in series to an opposite end of said secondary winding.

In each of independent claims 1, 6, 13, 16 and 19, a power converter includes two pairs of switches. Each pair of switches is simultaneously controlled by a respective control signal. One pair of switches is coupled in series to one end of a secondary winding of a transformer that is included in the power converter. This first pair of switches is configured such that the switches are simultaneously controlled using a first control signal. A second pair of switches is coupled in series to an opposite end of the secondary winding. This second pair of switches is also configured such that the switches are simultaneously controlled using a second control signal. Referring to FIG. 2 in the subject application (shown below), one pair of switches (e.g.,

switches S3 and S5) is connected to one end of secondary winding 208 and another pair of switches (e.g., switches S4 and S6) is connected to the opposite end of secondary winding 208. As illustrated, control signal LDR1 simultaneously controls the operational positions of switches S3 and S5. Similarly, control signal LDR2 simultaneously controls the operational positions of switches S4 and S6.

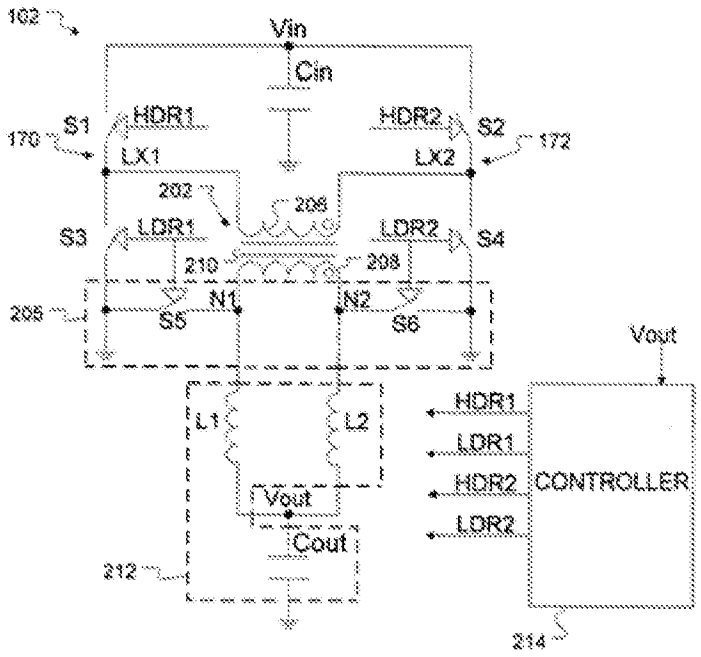

FIG. 2

In regards to simultaneously controlling two individual pair of switches, the subject application reads:

> "Advantageously, control signal LDR1 may be provided to both the low side switch S3 of path 170 of the full bridge circuit and to switch S5 of the rectified circuit 205 in order to simultaneously drive switches S3 and S5. In addition, control signal LDR2 may be provided to both the low side switch S4 of path 172 of the full bridge circuit and to switch S6 of the rectified circuit 205 in order to simultaneously drive switches S4 and S6. As such, only four control signals, HDR1, LDR1, HDR2, and LDR2 are necessary to control operation of all six switches S1 through S6." (page 4, lines 8-14)

By controlling two pairs of switches with two respective control signals, four control signals may be used to control six switches in the power converter. By reducing the number of control signals, the cost of a controller to generate these signals may correspondingly be reduced. In this regard, the subject application reads:

> In addition to a reduced core size, the controller 214 of the DC to DC converter 102 need only provide four control signals HDR1, LDR1, and HDR2, LDR2. As illustrated in FIG. 3, control signals HDR1 and LDR1 have opposite phases during each time interval T1 through T4, e.g., control signals HDR1 and LDR1 have opposite phases during each time interval T1 through T4, e.g., control signal HDR1 is high when LDR1 is low and vice versa. Control signals HDR2 and LDR2 also have opposite phases during each time interval. In addition, each pair of opposite phase control signals (HDR1/LDR1 and HDR2/LDR2) may be separated by a certain time interval, e.g., equal to time interval T2 in one embodiment as shown in FIG. 3. Advantageously, a controller 214 to provide such signals HDR1, LDR1 and HDR2, LDR2 may be readily available and inexpensive. For instance, if the switches S1 to S6 are implemented as MOSFETs, a portion of such a controller 214 may be a dual MOSFET driver as is known in the art. For example, such a dual MOSFET driver may provide switch control signals to a buck converter in another application. (page 8, lines 9-20) (emphasis added)

Wei is not understood to disclose or suggest a first pair of switches that is coupled in series to one end of said secondary winding and are simultaneously controlled using a first control signal, and a second pair of switches that is coupled in series to an opposite end of the secondary winding that are simultaneously controlled using a second control signal. Rather, the reference appears to describe pairs of switches connected to a secondary winding that are not simultaneously controlled. Referring to Figs. 4a-4d, reproduced below, a secondary winding W2 is connected to two pairs of switches. One switch pair (i.e., switches Q2 and Q5) is connected to one end of the secondary winding W2 while another switch pair (i.e., switches Q3 and Q6) is connected to another end of the secondary winding W2. However, as illustrated in each figure, the switches in each pair do not appear to be simultaneously controlled by a single control signal. For example, in figures 4a, 4b and 4d, switches Q2 and Q5 are in opposing positions (i.e., in Fig. 4a switch Q2 is open and switch Q5 is closed). Similarly, switches Q3 and Q6 are in opposing positions in figures 4a, 4b and 4d (i.e., in Fig. 4a switch Q3 is open and switch Q6 is closed).

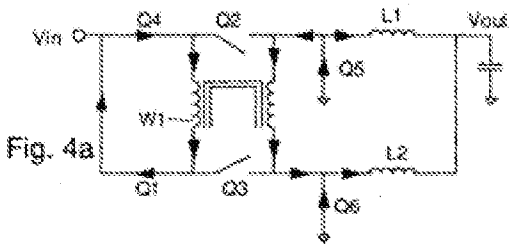

Fig. 4a

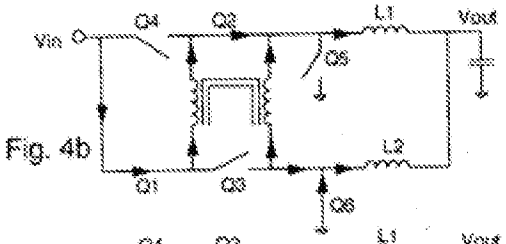

Fig. 4b

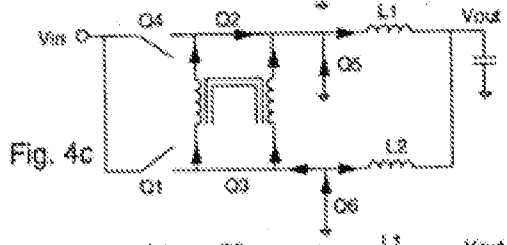

Fig. 4c

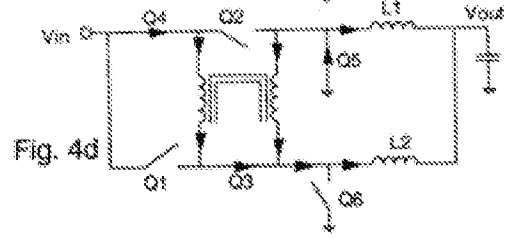

Fig. 4d

Wie is not understood to disclose or suggest using a single control signal to simultaneously control switch pair Q2 and Q5. Similarly, switch pair Q3 and Q6 are not understood to be simultaneously controlled with another single control signal. Rather, the reference appears to illustrate that each switch Q2, Q3, Q5 and Q6 is independently controlled.

Thus, Wei is not understood to disclose or suggest a first pair of switches that is coupled in series to one end of a secondary winding and that are simultaneously controlled using a first control signal, and a second pair of switches that is coupled in series to an opposite end of the secondary winding and that are also simultaneously controlled using a second control signal..

Accordingly, the Applicants respectfully assert that Wei is not a proper basis for a 35 USC §102(e) rejection, as the reference fails to disclose each and every element of the

Applicants' currently amended independent claims 1, 6, 16 and 19 and independent claim 13. Therefore, the Applicants respectfully assert that amended independent claims 1, 6, 13, 16 and 19 are patentable over the cited reference.

As dependent claims 2-5 depend (either directly or indirectly) upon amended independent claim 1, Applicants respectfully assert that claims 2-5 are also patentable over the cited reference. Further, as dependent claims 7-10 depend (either directly or indirectly) upon amended independent claim 6, Applicants respectfully assert that claims 7-10 are also patentable over the cited reference. Additionally, as dependent claims 14 and 15 depend (either directly or indirectly) upon amended independent claim 13, Applicants respectfully assert that claims 14 and 15 are also patentable over the cited reference. Still further, as dependent claims 7-10 depend (either directly or indirectly) upon amended independent claim 6, Applicants respectfully assert that claims 7-10 are also patentable over the cited reference. Additionally, as dependent claims 14 and 15 depend (either directly or indirectly) upon independent claim 13, Applicants respectfully assert that claims 14 and 15 are also patentable over the cited reference. Finally, as dependent claims 20-23 depend (either directly or indirectly) upon amended independent claim 19, Applicants respectfully assert that claims 20-23 are also patentable over the cited reference.

Having dealt with all the objections raised by the Examiner, it is respectfully submitted that the present application, as amended, is in condition for allowance. Thus, early allowance is earnestly solicited.

If the Examiner desires personal contact for further disposition of this case, the Examiner is invited to call the undersigned Attorney at 603.668.6560.

In the event there are any fees due, please charge them to our Deposit Account No. 50-2121.

Respectfully submitted,

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